POST OPERATIVE ANALGESIA IN CHILDREN : CAUDAL EPIDURAL ANALGESIA WITH BUPIVACAINE, RECTAL SUPPOSITORY OF DICLOFENAC SODIUM AND A COMBINATION OF BOTH

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CERTIFICATE

This is to certify that the dissertation entitled, ***"POST OPERATIVE ANALGESIA IN CHILDREN : CAUDAL EPIDURAL ANALGESIA WITH BUPIVACAINE, RECTAL SUPPOSITORY OF DICLOFENAC SODIUM AND A COMBINATION OF BOTH"*** *submitted by* ***Dr.B.KANCHANA MALA*** *in partial fulfillment for the* award of the degree of Doctor of Medicine in Anaesthesiology by the Tamilnadu Dr.M.G.R. Medical University, Chennai is a bonafide record of the work done by her in the Department of Anaesthesiology, Madras Medical College, during the academic year 2008 -2010.

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DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled in ***"POST OPERATIVE ANALGESIA IN CHILDREN : CAUDAL EPIDURAL ANALGESIA WITH BUPIVACAINE, RECTAL SUPPOSITORY OF DICLOFENAC SODIUM AND A COMBINATION OF BOTH"*** is a bonafide and genuine research work carried out by me under the guidance of **Prof. Dr. C.R. KANYAKUMARI, M.D., D.A.,** Professor and Head, Department of Anaesthesiology, Madras Medical College, Chennai.

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INTRODUCTION

The word pain is derived from Greek word ***poena***, meaning penalty[1]. It is defined as an unpleasant sensory or emotional experience associated with actual or potential tissue damage or described in terms of such damage.

But this definition is critiqued because nonverbal or preverbal individuals and those who are cognitively impaired may be unable to describe their pain.

Early assumptions that neonates and young children are less able to respond to pain and stress has been refuted and stress response in particular has been well characterized[2]. The developmental neurobiology of pain is complex and changes in pain processing takes place in early life[3,4].

Mechanism of acute pain includes both the peripheral and central components of the response to noxious stimulation of injury[5]. In the periphery, injury induces a local inflammatory response which includes sensitization of nociceptors and primary hyperalgesia. High threshold ***A delta and C fibers*** conduct noxious inputs to CNS, initiating a chain of events which includes reflex withdrawal from the stimulus, aversive

behavior, and the perception of pain. Sustained 'C' fiber inputs provoke a number of changes, known as ***central sensitization,*** which alters spinal sensory processing, leading to ***hyperalgesia and allodynia*** at the site of injury.

These mechanisms are different in early life.

1) Clear, measurable responses to pain which can be reduced by analgesia have been observed at all ages including the newborn but these are important differences in these responses . Sensory thresholds are lower in neonate and reflex responses are more exaggerated. The motor component of the withdrawal reflex is less coordinated and tends to involve whole body movements. In addition, the receptive fields of sensory neurons are relatively larger and more overlapping than in adults which probably influences sensory discrimination and localization.

2) Evidence for nerve plasticity and "windup" or sensitization after prolonged painful stimulation also exists at all ages. In adults, CNS stimulation following noxious stimuli occurs as a result of sustained C fiber inputs. Both A delta fiber

and C fiber functional activity matures postnatally. C fiber activity matures later. In contrast to adult, central sensitization is largely A delta fiber rather than C fiber mediated in early life.

3) The number, location, distribution and functionality of many important receptors and the N methyl D aspartate (NMDA) receptor, which is important for central sensitization.

4) The peripheral inflammatory response is not fully matured at birth and also undergoes developmental regulation.

Pain measurement

The vast range of physiological and behavioral responses, cognitive abilities, psychological development between the preterm neonate and the adolescent poses enormous problems for valid and reliable pain measurement.

Methods of pain assessment[6,7,8]:

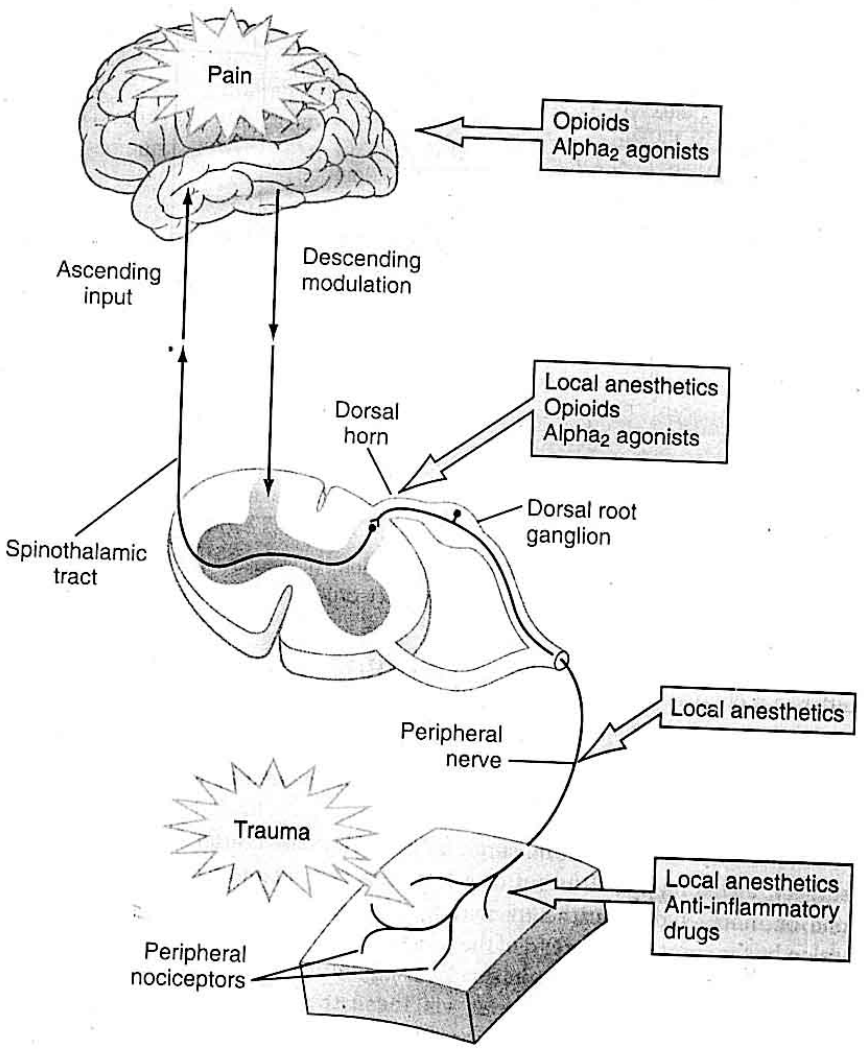
1) ***Self report measures:*** e.g., Faces, Manchester, VAS pain scales

Observational behavioral measures: e.g., CHEOPS, FLACC, Comfort scale.

FLACC behavioral pain scale: total score 0-10

Categories	**0**	**1**	**2**
Face	No expression or smile	Occasional grimace, withdrawn, disinterested	Frequent to constant frown, clenched jaw,
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	lying quietly, normal position, moves easily	Squirming, shifting back and forth , tense	Arched, rigid or jerking
Cry	No cry, awake or asleep	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasiona touching, hugging or being talked to, distractible	Difficult to control or comfort

Given the complexity of the pain mechanism, effective treatment of pain requires the use of multimodal therapies that target multiple sites along the pain pathways.



Pain can be treated at the peripheral level using local anesthetics, peripheral nerve blockade, NSAIDs[9,10], or opioids. At the spinal cord level it can be treated with local anesthetics, opioids, alpha $_2$ agonists,

and at cortical level opioids can be used. Most cases of ***moderate to severe pain are best treated with a combination of analgesic techniques.***

Multimodal analgesia with caudal epidural analgesia combined with rectal diclofenac sodium suppository has been used for inguinal surgeries with excellent results. First caudal epidural block was performed by ***Armitage***[10a] in 1879 and ilio-inguinal nerve block was proven to be effective as caudal epidural block ***(Markham 1986)***[11]**,** and simple wound infiltration was as effective as ilio- inguinal nerve block and caudal epidural block ***(Fell.D. 1988)***[12]**.**

This study was designed to ***compare the efficacy and complications of caudal epidural analgesia alone, rectal suppository of diclofenac sodium and a combination of both***[13]**.**

AIM OF STUDY

This study compares the efficacy of producing post operative pain relief and the occurrence of complications using caudal epidural administration of 1ml / kg of 0.25% bupivacaine, 1mg/kg of rectal suppository of diclofenac sodium and a combination of both in 90 children between ages 1-11 years who underwent circumcision or herniotomy (Processus vaginalis sac ligation).

METHODOLOGY

The study was conducted with the approval of Ethical Committee and written informed consent of the parents or guardian

Inclusion criteria:

1) ASA Grade I Children
2) Children 1-11 yrs
3) Children for elective inguinal herniotomy and circumcision.

Exclusion criteria:

1) Children less than 1 yr of age
2) Spinal deformity/ sacral deformity
3) Coagulopathies
4) Platelet disorders
5) Infection at site
6) Generalised sepsis
7) H/O Asthma
8) H/O Renal and liver diseases

A randomized controlled study was done to compare caudal epidural analgesia with 0.25% bupivacaine, 1mg/kg of diclofenac sodium rectal suppository and a combination of both for post operative analgesia

The clinical study was conducted at the Institute of Child Health, Anaesthesiology Department between the period of April 2009 and May 2009. Ninety children between age group 1-11 years scheduled for elective inguino-genital surgeries were randomly divided into 3 groups for study. The age and weight of each child was recorded. All the children had their last feed at about 3 a.m in the morning .

Group I - received caudal epidural block with 1ml/kg of 0.25 % bupivacaine

Group II - received rectal diclofenac sodium suppository (1mg/kg)

Group III - received both caudal epidural block with 1ml/kg of 0.25 % bupivacaine and rectal diclofenac sodium suppository (1mg/ kg).

All the children were premedicated with 50 mg/kg of oral trichlophos syrup 1 hr prior to surgery and the diclofenac sodium

suppository was inserted for Group II children once they were calm and tranquil.

All the operations were carried out under general anaesthesia. Intravenous line was secured with 22G IV cannula onto a vein on the dorsum of hand. Premedication of Injection Fentanyl 2 microgram/kg was administered. Anaesthesia was induced in the theatre with titrated doses of Injection Propofol along with N_2O, O_2 50:50 with halothane 1%. Precordial stethoscope, pulse oximeter, NIBP, ECG, SPO_2 monitors were attached. An appropriate sized LMA was positioned in situ, bilateral air entry was checked and LMA was fixed , anaesthesia was maintained with 67% N_2O & 33% O_2 and halothane1-2% using Jackson Rees modification of Ayre's T piece with spontaneous respiration. After induction of general anaesthesia, Group I & III children received caudal epidural injection of 1ml/kg of 0.25%bupivacaine using 23G needle. Intraoperatively balanced salt solution was infused. Heart rate, respiratory rate, blood pressure were recorded at an interval of 5 minutes. Children were extubated in deep plane of anaesthesia. Children remained in the recovery room until they were fully awake and then shifted to the post operative ward .

The Children were assessed by the staff nurse who was not aware of group allocation. Assessment of pain, sedation, pulse rate, B.P, SPO_2, and complications like nausea and vomiting, respiratory depression, urinary retention, etc., was done at 0,1/2,1,2,3,4,5,6,10,12 hrs postoperatively. Pain was assessed using FLACC pain scale and rescue analgesia of syrup Paracetamol 15mg/kg given at pain score 4 or above.

Sedation was assessed using **Ramsay sedation score** as follows:

SCORE	**CLINICAL DESCRIPTION**
I	Anxious and agitated
II	Cooperative, oriented, tranquil
III	Responds only to verbal commands
IV	Asleep with brisk response to light stimuli
V	Asleep with sluggish response to stimuli
VI	Asleep without response to stimuli

Oral feeds were allowed after 6hrs. All the children were examined prior to discharge for clinical evaluation of neurological system.

REVIEW OF LITERATURE

ANATOMY OF CAUDAL SPACE

Caudal anaesthesia is the oldest and still the most commonly used technique of epidural blockade in children. It is performed via the sacral hiatus, through the sacrococcygeal membrane. Caudal anesthesia reduces the stress hormone response to surgery [33-35].

ANATOMY OF SACRAL HIATUS

It is a V-shaped aperture resulting from the lack of dorsal fusion of the fifth and fourth sacral vertebral arches. It is limited laterally by two palpable bony structures, the ***sacral cornua,*** and it is covered by the ***sacrococcygeal membrane*** (sacral continuation of the ligamentum flava). The distance from skin to the epidural space is hardly influenced by the age and weight of the patient; 25mm long needles are long enough to reach the sacral epidural space and short enough to prevent inadvertent dural puncture in most patients. With growth, the axis of sacrum changes and the sacral hiatus may even close [36]. These changes makes the caudal epidural anaesthesia more difficult to perform in children older than 6 to 7 years of age.

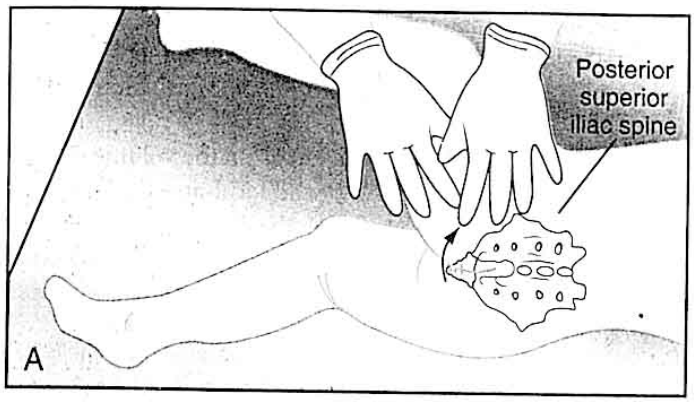
Indications and Contraindications:

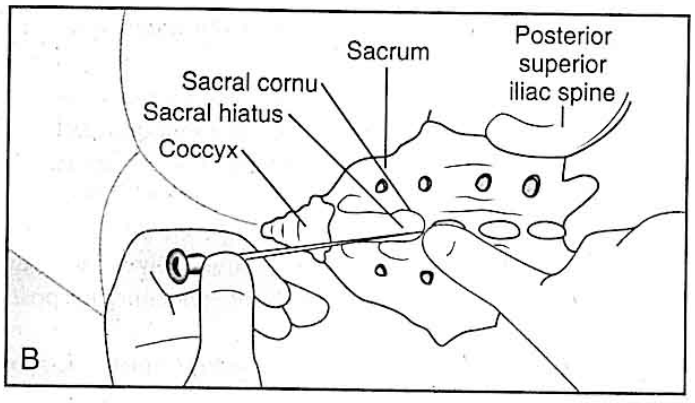
Caudal epidural anaesthesia is indicated for ***infra-umbilical*** surgical procedures, including inguinal hernia repair, urinary and lower digestive tract surgery, and orthopaedic procedures on the pelvic girdle and lower extremities.[37,38]

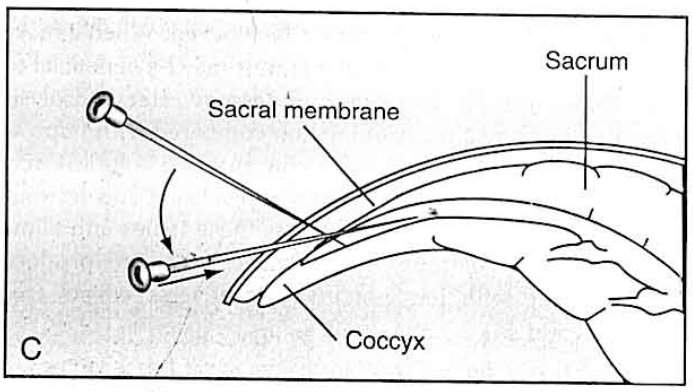
Contra indicated in ***major malformations*** of the sacrum, ***meningitis*** and ***intracranial hypertension.***

Technique :

The child is placed either in the ***lateral decubitus*** or ***prone*** position with a small roll beneath the anterior iliac crests. The cornua of the sacral hiatus are most easily palpated as two bony ridges, about 0.5 to 1.0 cm apart, when the examiner moves his or her finger in a medial to lateral direction (Fig.A). When the sacral cornua are not prominent or easily appreciated, it may prove easier to locate the space by palpating, the L4-5 intervertebral space in the midline and then palpate in a caudal direction until the sacral hiatus is reached. Because the space between the sacrum and coccyx may be mistaken for the sacral hiatus, the latter technique may make identification of the landmarks easier.







The proper location is just at the beginning of the crease of the buttocks. A short-bevel stiletted needle, 22-gauge, should be used because a long-bevel needle may increase the risk of intravascular injection.

Some practitioners believe that a stiletted needle avoids the possibility of introducing a dermal plug into the caudal space. Other practitioners believe that if a hole is made in the skin and subcutaneous tissues using an 18-gauge needle, an intravenous catheter can be inserted without entraining a dermal plug and transferring it to the subarachnoid space. Others suggest that the intravenous catheter should, be inserted with the bevel facing downward, because once in place easy advancement of the intravenous catheter off the needle suggests that the caudal canal has been entered and may reduce the risk of intravascular placement.

The needle is initially directed **cephalad** at a **45- to 75-degree angle** to the skin until it "pops" through the sacrococcygeal ligament (Fig) into the caudal canal, which is contiguous with the epidural space. If bone is encountered before the sacrococcygeal ligament, the needle should be withdrawn several millimeters, the angle with the skin decreased to approximately 30 degrees, and the needle again should be advanced in a cephalad direction until the sacrococcygeal ligament is pierced (see Fig). As the needle is advanced slightly farther, bone (the anterior table of the sacrum) is encountered, and the needle should be leveled in orientation before further advancement, so that it is nearly

parallel to the plane of the child's back. Once the caudal-epidural space has been entered, the needle is advanced several millimeters. Further advancement with a needle should not be attempted because in infants the dural sac lies relatively caudad and it is possible to easily enter the subarachnoid space by this route.

A negative aspiration for both blood and CSF is confirmed, a test dose of local anesthetic is administered. If neither hemodynamic nor ECG changes are evident after the test dose, the remainder of the dose of local anesthetic for a single-shot caudal anaesthesia should be slowly injected in an **incremental fashion** over several minutes.

Although the risk of intravascular injection may be diminished with caudal blockade, it is also possible that the needle could be misplaced in the intramedullary cavity of the sacrum. **Intraosseous injection** of drugs results in very rapid uptake, similar to direct intravenous injection.

The block may be placed before the onset of surgery without a significant decrement in duration of postoperative analgesia for short surgical procedures. This has the advantage of reducing the amount of general anesthesia needed, resulting in a more rapid recovery. In

addition, there is adequate time for the block to "set up," improving the chances of a pain-free awakening.

Catheter insertion for a continuous caudal anaesthesia follows a similar procedure. First, one should determine the length of catheter that should be inserted into the caudal space by measuring the distance from the sacral hiatus to the desired site where the catheter tip will be positioned.

An 18-gauge intravenous catheter or an 18-gauge Crawford needle is used to enter the epidural space. Because the internal diameters of different intravenous cannulae vary, it is advisable to test that the epidural catheter easily passes through the cannula before inserting the intravenous cannula. Once the epidural space has been accessed, the intravenous catheter and needle are advanced several millimeters. The catheter is then advanced off the needle 1 to 2 cm. Localization of the intravenous catheter tip in the epidural space is confirmed by lack of resistance to the injection of a small volume of saline and lack of aspiration of CSF or blood. If the needle had perforated the sacrum, the cannula would not easily advance off the needle.

During injection, the area of the back overlying the intravenous catheter tip should be palpated; swelling or a fullness on injection of local anaesthetic indicates a subcutaneous rather than an epidural catheter placement. The epidural catheter is advanced through the intravenous catheter and the intravenous catheter is withdrawn. After confirming that aspiration of the epidural catheter yielded no blood or CSF, a test dose of local anaesthetic containing 1:200,000 epinephrine is administered. Test doses should be repeated each time catheter is reinjected with a bolus dose of local anaesthetic.

Selection of Drug

The drug dose required for epidural blockade at a given dermatomal level depends on the ***volume*** (not concentration) ***of the local anesthetic*** and the ***volume of the epidural space***, which may change with age. Numerous studies have discussed the doses of local anesthetic drugs used for caudal anesthesia in children. The volumes of local anesthetic that block from a T4 to a T10 dermatome level span a fivefold range. The formula of ***Takasaki*** and colleagues has best approximated good clinical results:

Volume (mL) = 0.05 mL/kg/dermatome to be blocked.

Thus, in a 10-kg child in whom we wish to produce a T10 dermatome level, we would use a volume of (0.05 mL/kg/dermatome) x (10 kg) x (12 dermatomes) = 6 mL.

Another simple method is to administer 1 mL/kg (up to 20 mL) of 0.125% bupivacaine with 1:200,000 epinephrine; this generally provides a sensory block with minimal motor block up to the T4-T6 level.

Caudal epidural anaesthesia is basically a single shot technique. The dosage of ***Armitage*** remains the most dependable.[39] With 0.5ml/kg all sacral dermatomes are blocked, 1ml/kg sacral and lumbar dermatomes are blocked, 1.5ml/kg blocks mid thoracic dermatomes. However, when 1.25 ml/kg is injected there is a danger of excessive rostral spread (above T_4)[40]

Because the level of the block depends on the volume of drug administered, the concentration of the local anaesthetic should be based on the desired density of the block (less dense for postoperative analgesia, more dense for intraoperative anesthesia) and on the risk of toxicity.

Complications

Complications after epidural anaesthesia or analgesia include ***intravascular*** or ***intraosseous*** injection, ***hematoma, neural*** injury, and ***infection.***

Infection is of grave concern when it occurs in either the sub-arachnoid or the epidural space. ***Epidural abscess*** and ***meningitis*** are the most potentially serious complications. The signs and symptoms (Table) are the same as for epidural hematoma, although fever, increased erythrocyte sedimentation rate, and increased leukocyte count with a leftward shift are also often present. Surgical drainage may be necessary.

Infants and toddlers require meticulous management of these catheters and their insertion site. A mild erythema occasionally occurs at the site of catheter insertion when children have indwelling catheters in place for several days, and this must be distinguished from a cellulitis. If there is any question that the site is infected, then the catheter should be removed.

Clinical experience with caudal/epidural catheters has shown that it is common for fluid to leak from the insertion site, especially in the presence of presacral edema. Any child who develops a fever of unknown origin and who also has an indwelling caudal/epidural catheter should have the catheter removed.

Epidural hematoma is also a rare complication after epidural blockade. Optimal outcome depends on rapid diagnosis and prompt treatment and decompression. Signs and symptoms are presented in Table. The presence of clinically important ***coagulopathy*** or ***thrombocytopenia*** is an unacceptable risk for developing an epidural hematoma and is a ***contraindication*** to central neuraxial blockade.

Table : Signs and Symptoms of Epidural Hematoma and Abscess

Abscess	**Hematoma**
Fever	Afebrile
± ↑ WBC	WBC normal
± ↑ Sedimentation rate	Sedimentation rate normal or slightly elevated
± Left WBC shift	
Localized back pain	Localized back pain
Radicular pain	Radicular pain
Paraplegia	Paraplegia
Sensory loss	Sensory loss
Urinary and fecal retention	Urinary and fecal retention
Incontinence	Incontinence
Local tenderness	Local tenderness
Defect on myelography	Defect on myelography
Localized lesion on magnetic resonance imaging	Localized lesion on magnetic resonance imaging

Urinary retention has been rarely associated with epidural anaesthesia postoperatively. Delayed postoperative voiding was an issue years ago, when preoperative fasting was excessively prolonged. Hence true urinary retention is very rare.

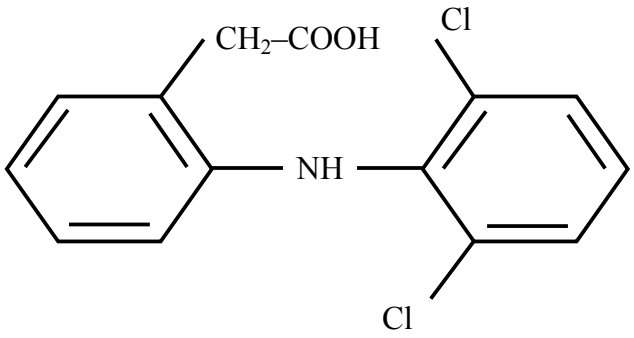
The epidural and subarachnoid use of opioids, however, is associated with an increased incidence of urinary retention. The incidence of neural injury after epidural blockade may be greater than previously appreciated.

Block failure is not unusual (3% to 5%), especially in children older than 7years of age but even in younger patients the failure rate is high[43]

Pharmacology of Diclofenac Sodium

Diclofenac sodium[14] is a NSAID used for management of mild to moderate pain. It is a potent analgesic, antipyretic and suppresses acute and chronic inflammation. It acts by ***inhibiting prostaglandin*** (PG) ***synthesis***[15]. Synthesis of PG F is inhibited in peripheral tissues[16] which in turn reduces inflammatory response to trauma there by reducing peripheral nociception and pain perception. NSAIDs reduce both acute pain and subsequent hyperalgesic response via central modulation.

Structure of Diclofenac Sodium



Diclofenac sodium like other NSAIDs is a ***reversible inhibitor*** of secondary phase of ***induced platelet aggregation.*** At therapeutic doses it has little effect on bleeding time. It also affects polymorphonuclear leucocyte function, decreases chemotaxis, superoxide and protease production.

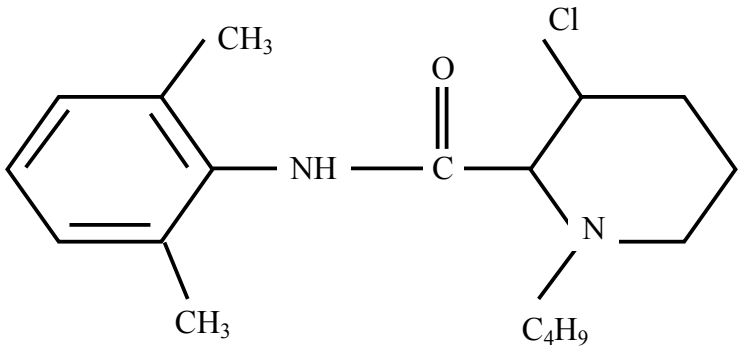
Rapidly absorbed after oral, rectal, intramuscular administration. Peak plasma level is reached within 30 minutes after oral and within 1 hour after, rectally administered doses. ***Oral drug*** undergoes significant ***first pass metabolism*** unlike rectal suppository[17]. GIT side effects are reduced by rectal route of administration. It is metabolized by the liver . 90% of the drug is removed from the body within 3-4hrs. It is excreted in the urine and bile. The mean elimination $t_{½}$ is 1.1 to 1.8 hrs

which limits its potential for drug accumulation. The pharmacological effects lasts longer. ***Maximum dose is 2-3mg /kg /24hrs.***

Side effects are Gastro intestinal (GI) symptoms like abdominal pain, nausea and vomiting. Erosions of GI mucosa and ulcers are rare. It is ***contraindicated*** in patients with H/O ***GI bleed, haemostatic defects, compromised hepatic and renal function, aspirin sensitive asthma***[18,19]**.**

Pharmacology of Bupivacaine

Bupivacaine remains the most commonly used ***amide*** local anaesthetic agent for regional blockade in infants and children. Analgesia remains for upto 4hrs after a single administration. The most commonly used concentration for peripheral nerve blocks is 0.25% in children.



It is highly bound to plasma proteins (alpha1- acid glycoprotein). It is a racemic mixture of the ***levo*** and ***dextro*** enatiomers; the ***l-isoform*** is the ***bioactive*** one and the d-isoform contributes to toxicity. l-bupivacaine has less cardiac and CNS toxicity by 30%. The volume of distribution is 3.9+/- 2.01ml/kg in neonates. Clearance is 7.1+/-3.2ml/kg/min. Elimination half life is 6 to 24hrs[20,21,22].

Toxicity of Bupivacaine

CNS toxicity manifests when the plasma concentration of bupivacaine is 2 to 2.5mcg/ml. In children plasma protein binding is lower, hence ***cardiac toxicity occurs concomitantly with CNS toxicity.***

The major toxic effects of bupivacaine are on the ***cardiovascular system*** and the ***CNS***. Bupivacaine readily cross the blood-brain barrier to cause alterations in CNS function. A consistent sequence of symptoms can be observed as plasma local anaesthetic concentrations progressively increase, although this may not be readily apparent in infants and small children. Because of the lower threshold for cardiac toxicity with bupivacaine, cardiac and CNS toxicity may occur virtually simultaneously in infants and children or ***cardiac toxicity may even precede CNS toxicity.***

During the intraoperative use of bupivacaine, the risk of cardiac toxicity may be increased by the concomitant use of volatile anaesthetics and the CNS effects of the general anaesthetic may obscure the signs of CNS toxicity until devastating cardiovascular effects are apparent.

In adults, the earliest symptom of local anaesthetic toxicity is circumoral paresthesia, which is due to the high tissue concentrations of local anaesthetic rather than CNS effects. The development of cicumoral paresthesias is followed by the prodromal CNS symptoms of lightheadedness and dizziness, which progress to both visual and auditory disturbances, such as difficulty in focusing and tinnitus.

Signs of CNS toxicity during this time are shivering, slurred speech, and muscle twitching. As the plasma concentration of local anaesthetic continues to increase, CNS excitation occurs, resulting in generalised seizures. Further increases in the local anaesthetic concentration depresses the CNS, with respiratory depression leading to a respiratory arrest. In adults, cardiovascular toxicity usually follows CNS toxicity.

There is evidence that the ***slow or flicker potasium channels*** may ***play a significant role*** in bupivacaine toxicity.

With an intravascular injection of bupivacaine with epinephrine, characteristic changes on the electrocardiogram (ECG) may be seen without any observable symptoms of CNS toxicity. Even a small intravenous dose of 1 to 2 μg/kg of epinephrine in a 1:200,000 solution with 0.25% bupivacaine will produce ***peaked T waves with ST segment elevation*** on the ECG, particiularly in the ***lateral chest leads.***

Tachycardia is ***not a reliable indicator*** of an ***intravascular injection of bupivacaine***, occurring in only 73% of intravascular injections during general anaesthesia.

Post-dural puncture ***headache*** was relatively ***rare in children*** younger than 13 years of age. In most instances, the headaches were mild and resolved spontaneously.

Backache is a frequent postoperative complaint after both general and regional anaesthesia in adults. The incidence in children in unknown. Neurologic sequelae after caudal anaesthesia are exceedingly rare.

There are no reports in the literature of permanent neurologic injury due to caudal block, but good data in children are lacking. There have been no cases detected in over 1700 consecutive caudal

anaesthetics at the University of Vermont Medical Center (***C.Abajian,*** personal communication).

Jean Enthuse Sicard (1872-1929) and ***Fernand Cathelin*** (1873-1945) independently introduced cocaine through sacral hiatus in 1901, becoming first practitioners of caudal epidural anaesthesia . Sicard was a neurologist and used the technique to treat sciatica and tabes but Cathelin used the technique for surgical anaesthesia.

Arthur Lauren (1846-1958)[23] pupil of Heinrich Braun (1862-1934) used caudal anaesthesia with large volumes of procaine for pelvic surgeries. ***Heile*** [24] published the study of epidural space in 1913, his technique was to enter epidural space through the intervertebral foramina. ***Tuffier***[25] was aware of the need for entry at higher levels but was unable to perfect a reliable technique for lumbar or thoracic epidural injections. In 1921, ***Fidel Pages***[26] (1886-1923), a Spanish military surgeon, devised a technique to introduce epidural procaine at all levels of neuraxis. He used a blunt needle and then felt and heard entry of the needle through ligamentum flavum.

Archille Mario Dogliothi[27] (1897-1966) described epidural injection of local anaesthetics in 1931. He did extreme studies to

determine spread of solutions within epidural and paravertebral spaces after injection. His innovation was ***Dogliothi's method of identification of epidural space***. His 1939 text book illustrates the use of continuous pressure on the plunger of a saline filled syringe as the needle is advanced through the ligamentous structures.

Gutierrez of Argentina collected valuable data on a large series of successful epidural anaesthesia. He developed the ***hanging drop sign,*** which is used by some anaesthesiologists to identify the epidural space. ***Charles Odom***[29] of New Orleans published 285 cases of lumbar epidural anaesthesia in 1936 and introduced the concept of test dose to detect intrathecal injection**.** ***John R Harger***[30] & co workers of Cook county hospital in Chicago reported 1000 cases without a fatality when using a single injection of 45to 50ml of 2%procaine.

Edward B Touhy[31] (1908-1959) used a urethral catheter threaded through a large Huber tipped spinal needle to provide continuous spinal anaesthesia. The Touhy needle, a simple modification of Huber needle, was used by him to thread the catheter into the subarachnoid space. In 1947, ***Manvel Martines Curbelo***[32] of Havana, Cuba used the Touhy needle and a small urethral catheter to provide continuous lumbar epidural anaesthesia.

Perception of pain

Somatic pain is a subjective sensory experience resulting from the intermixing of three main components: **motivational-directive, sensory-discriminatory, and cognitive-evaluative.** The motivational-directive component is conveyed by unmyelinated C fibers ("slow" pain or "true" pain). It leads to protective reflexes such as autonomic reactions, muscle contractions, and rigidity. C fibers are fully functional from early fetal life onward.

RESULTS

Ninety children were randomly classified as,

Group I

Thirty children received caudal epidural block with 1 ml/kg of 0.25% Bupivacaine

Group II

30 Children received 1mg/kg of rectal diclofenac sodium suppository.

Group III

30 Children received both caudal epidural block with 1 ml/kg of 0.25%. Bupivacaine and 1mg/kg of rectal diclofenac sodium suppository.

All the Children were matched for age, sex, and weight.

COMPARISON OF AGE BETWEEN GROUPS

Descriptives

AGE

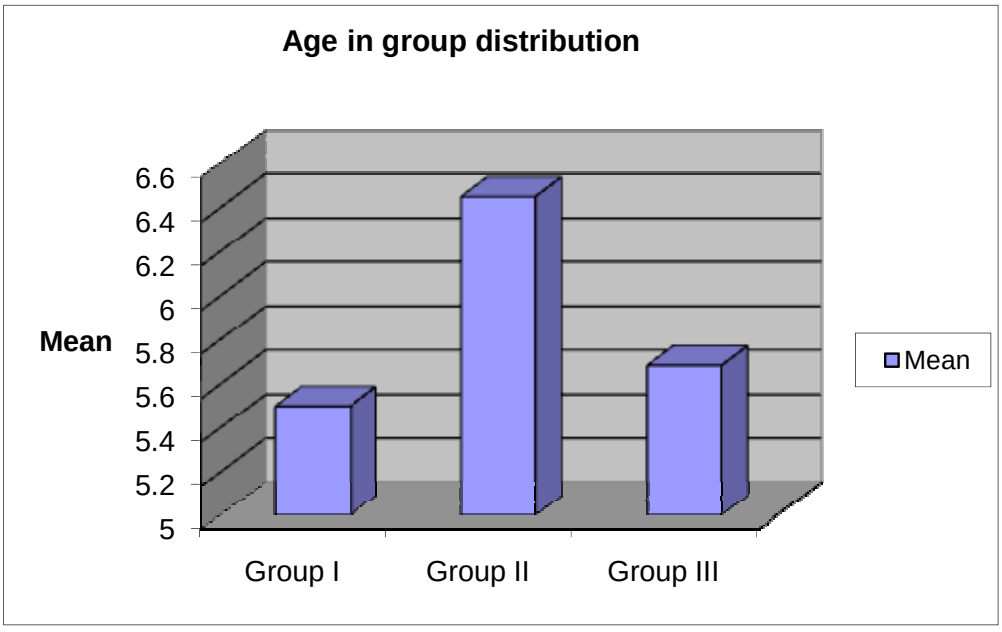
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
GROUP - I	30	5.5000	2.59230	.47329	4.5320	6.4680	1.20	11.00
GROUP - II	30	6.4500	2.54392	.46445	5.5001	7.3999	2.00	11.00
GROUP - III	30	5.6833	2.05310	.37484	4.9167	6.4500	3.00	11.00
Total	90	5.8778	2.41725	.25480	5.3715	6.3841	1.20	11.00

ANOVA

AGE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15.239	2	7.619	1.313	.274
Within Groups	504.797	87	5.802		
Total	520.036	89			

Age comparison between groups shows no statistical significance.



COMPARISON OF SEX BETWEEN GROUPS

Crosstab

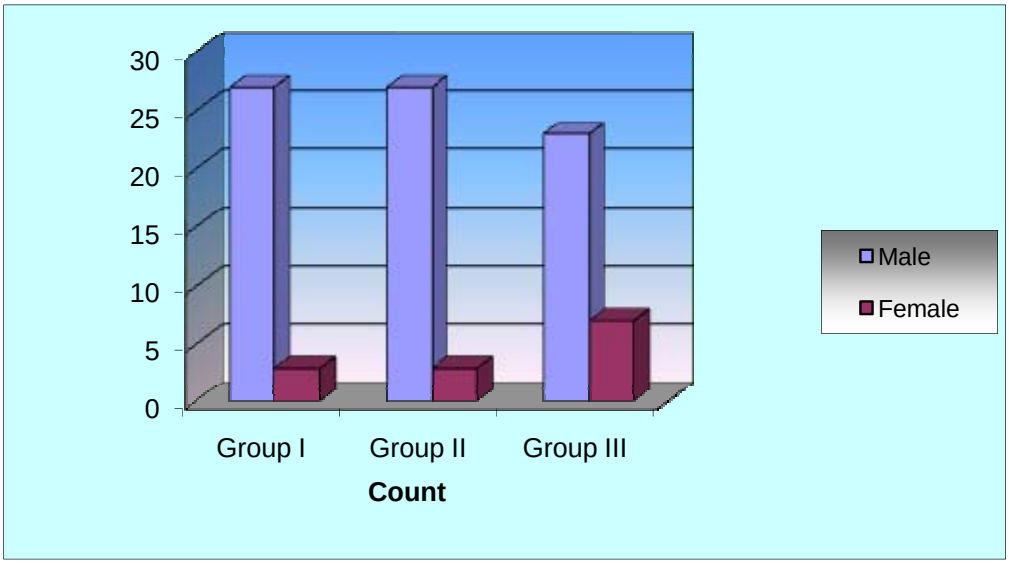
			GROUP			
			GROUP - I	GROUP - II	GROUP - III	Total
SEX	MALE	Count	27	27	23	77
		% within GROUP	90.0%	90.0%	76.7%	85.6%
	FEMALE	Count	3	3	7	13
		% within GROUP	10.0%	10.0%	23.3%	14.4%
Total		Count	30	30	30	90
		% within GROUP	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.877[a]	2	.237
Likelihood Ratio	2.725	2	.256
Linear-by-Linear Association	2.134	1	.144
N of Valid Cases	90		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 4.33.

Sex comparison between groups is stastistically insignificant



COMPARISON OF WEIGHT BETWEEN GROUPS

ANOVA

WEIGHT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	67.356	2	33.678	2.231	.114
Within Groups	1313.133	87	15.093		
Total	1380.489	89			

Multiple Comparisons

Dependent Variable: WEIGHT

Tukey HSD

(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
GROUP - I	GROUP - II	-1.967	1.003	.128	-4.36	.43
	GROUP - III	-.300	1.003	.952	-2.69	2.09
GROUP - II	GROUP - I	1.967	1.003	.128	-.43	4.36
	GROUP - III	1.667	1.003	.226	-.73	4.06
GROUP - III	GROUP - I	.300	1.003	.952	-2.09	2.69
	GROUP - II	-1.667	1.003	.226	-4.06	.73

Descriptives

WEIGHT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
GROUP - I	30	15.73	3.921	.716	14.27	17.20	9	25
GROUP - II	30	17.70	4.473	.817	16.03	19.37	10	30
GROUP - II	30	16.03	3.146	.574	14.86	17.21	10	25
Total	90	16.49	3.938	.415	15.66	17.31	9	30

Weight comparison between groups is statistically insignificant

COMPARISON OF SURGERIES BETWEEN GROUPS

Crosstab

			GROUP			
			GROUP - I	GROUP - II	GROUP - III	Total
SURGERY	INDUINAL HERNI	Count	8	9	13	30
		% within GROUI	26.7%	30.0%	43.3%	33.3%
	HYDROCELE	Count	1	1	1	3
		% within GROUI	3.3%	3.3%	3.3%	3.3%
	ORCHIDOPEHY	Count	0	2	0	2
		% within GROUI	.0%	6.7%	.0%	2.2%
	CIRCUMCISION	Count	14	17	14	45
		% within GROUI	46.7%	56.7%	46.7%	50.0%
	HERNIOTOMY	Count	7	1	2	10
		% within GROUI	23.3%	3.3%	6.7%	11.1%
Total		Count	30	30	30	90
		% within GROUI	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.000[a]	8	.151
Likelihood Ratio	12.077	8	.148
Linear-by-Linear Association	2.853	1	.091
N of Valid Cases	90		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .67.

Children were matched for type of surgery, there was no statistical significance.

COMPARISON OF DURATION OF SURGERY

Descriptives

DUR.O.S

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
GROUP - I	30	32.67	9.072	1.656	29.28	36.05	20	60
GROUP - II	30	33.17	9.421	1.720	29.65	36.68	25	60
GROUP - III	30	30.83	7.321	1.337	28.10	33.57	20	60
Total	90	32.22	8.615	.908	30.42	34.03	20	60

ANOVA

DUR.O.S

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	90.556	2	45.278	.605	.549
Within Groups	6515.000	87	74.885		
Total	6605.556	89			

Multiple Comparisons

Dependent Variable: DUR.O.S

Tukey HSD

(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
GROUP - I	GROUP - II	-.500	2.234	.973	-5.83	4.83
	GROUP - III	1.833	2.234	.691	-3.49	7.16
GROUP - II	GROUP - I	.500	2.234	.973	-4.83	5.83
	GROUP - III	2.333	2.234	.551	-2.99	7.66
GROUP - III	GROUP - I	-1.833	2.234	.691	-7.16	3.49
	GROUP - II	-2.333	2.234	.551	-7.66	2.99

Comparison of duration of surgery between groups is statistically insignificant.

COMPARISON OF POST OPERATIVE PULSE RATE BETWEEN GROUPS AT 30MIN., 1,2,3,4,5,6,7 HRS.

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
PR30	GROUP - I	30	87.93	12.741	2.326	83.18	92.69	70	122
	GROUP - II	30	92.67	18.237	3.330	85.86	99.48	70	124
	GROUP - III	30	84.27	14.818	2.705	78.73	89.80	60	120
	Total	90	88.29	15.645	1.649	85.01	91.57	60	124
PR1	GROUP - I	30	88.27	12.334	2.252	83.66	92.87	71	120
	GROUP - II	30	91.23	15.384	2.809	85.49	96.98	72	111
	GROUP - III	30	83.23	13.811	2.521	78.08	88.39	60	110
	Total	90	87.58	14.137	1.490	84.62	90.54	60	120
PR2	GROUP - I	30	88.57	12.328	2.251	83.96	93.17	72	124
	GROUP - II	30	89.90	21.419	3.911	81.90	97.90	10	115
	GROUP - III	30	86.53	14.134	2.581	81.26	91.81	72	116
	Total	90	88.33	16.311	1.719	84.92	91.75	10	124
PR3	GROUP - I	30	91.03	12.156	2.219	86.49	95.57	74	126
	GROUP - II	30	95.40	13.397	2.446	90.40	100.40	76	114
	GROUP - III	30	86.80	19.272	3.519	79.60	94.00	8	114
	Total	90	91.08	15.496	1.633	87.83	94.32	8	126
PR4	GROUP - I	30	91.23	11.743	2.144	86.85	95.62	75	122
	GROUP - II	29	95.45	11.534	2.142	91.06	99.84	78	116
	GROUP - III	30	92.47	11.796	2.154	88.06	96.87	75	118
	Total	89	93.02	11.695	1.240	90.56	95.49	75	122
PR5	GROUP - I	28	93.07	13.784	2.605	87.73	98.42	52	124
	GROUP - II	27	96.33	10.092	1.942	92.34	100.33	80	118
	GROUP - III	29	94.90	11.938	2.217	90.36	99.44	76	120
	Total	84	94.75	11.982	1.307	92.15	97.35	52	124
PR6	GROUP - I	22	92.64	10.751	2.292	87.87	97.40	78	122
	GROUP - II	22	97.82	9.323	1.988	93.68	101.95	84	118
	GROUP - III	26	96.35	11.085	2.174	91.87	100.82	78	116
	Total	70	95.64	10.523	1.258	93.13	98.15	78	122
PR7	GROUP - I	4	93.50	1.915	.957	90.45	96.55	92	96
	GROUP - II	5	90.60	2.966	1.327	86.92	94.28	86	94
	GROUP - III	3	90.33	17.898	10.333	45.87	134.79	80	111
	Total	12	91.50	8.040	2.321	86.39	96.61	80	111

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
PR30	Between Groups	1064.089	2	532.044	2.234	.113
	Within Groups	20720.400	87	238.166		
	Total	21784.489	89			
PR1	Between Groups	981.356	2	490.678	2.540	.085
	Within Groups	16806.600	87	193.179		
	Total	17787.956	89			
PR2	Between Groups	172.467	2	86.233	.319	.728
	Within Groups	23505.533	87	270.179		
	Total	23678.000	89			
PR3	Between Groups	1109.489	2	554.744	2.382	.098
	Within Groups	20260.967	87	232.885		
	Total	21370.456	89			
PR4	Between Groups	275.949	2	137.975	1.009	.369
	Within Groups	11760.006	86	136.744		
	Total	12035.955	88			
PR5	Between Groups	147.203	2	73.602	.507	.604
	Within Groups	11768.547	81	145.291		
	Total	11915.750	83			
PR6	Between Groups	315.823	2	157.912	1.445	.243
	Within Groups	7324.248	67	109.317		
	Total	7640.071	69			
PR7	Between Groups	24.133	2	12.067	.158	.856
	Within Groups	686.867	9	76.319		
	Total	711.000	11			

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PR30	GROUP - I	GROUP - II	-4.733	3.985	.464	-14.23	4.77
		GROUP - III	3.667	3.985	.629	-5.83	13.17
	GROUP - II	GROUP - I	4.733	3.985	.464	-4.77	14.23
		GROUP - III	8.400	3.985	.094	-1.10	17.90
	GROUP - III	GROUP - I	-3.667	3.985	.629	-13.17	5.83
		GROUP - II	-8.400	3.985	.094	-17.90	1.10
PR1	GROUP - I	GROUP - II	-2.967	3.589	.688	-11.52	5.59
		GROUP - III	5.033	3.589	.344	-3.52	13.59
	GROUP - II	GROUP - I	2.967	3.589	.688	-5.59	11.52
		GROUP - III	8.000	3.589	.072	-.56	16.56
	GROUP - III	GROUP - I	-5.033	3.589	.344	-13.59	3.52
		GROUP - II	-8.000	3.589	.072	-16.56	.56
PR2	GROUP - I	GROUP - II	-1.333	4.244	.947	-11.45	8.79
		GROUP - III	2.033	4.244	.881	-8.09	12.15
	GROUP - II	GROUP - I	1.333	4.244	.947	-8.79	11.45
		GROUP - III	3.367	4.244	.708	-6.75	13.49
	GROUP - III	GROUP - I	-2.033	4.244	.881	-12.15	8.09
		GROUP - II	-3.367	4.244	.708	-13.49	6.75
PR3	GROUP - I	GROUP - II	-4.367	3.940	.512	-13.76	5.03
		GROUP - III	4.233	3.940	.532	-5.16	13.63
	GROUP - II	GROUP - I	4.367	3.940	.512	-5.03	13.76
		GROUP - III	8.600	3.940	.080	-.80	18.00
	GROUP - III	GROUP - I	-4.233	3.940	.532	-13.63	5.16
		GROUP - II	-8.600	3.940	.080	-18.00	.80
PR4	GROUP - I	GROUP - II	-4.215	3.045	.354	-11.48	3.05
		GROUP - III	-1.233	3.019	.912	-8.43	5.97
	GROUP - II	GROUP - I	4.215	3.045	.354	-3.05	11.48
		GROUP - III	2.982	3.045	.592	-4.28	10.24
	GROUP - III	GROUP - I	1.233	3.019	.912	-5.97	8.43
		GROUP - II	-2.982	3.045	.592	-10.24	4.28
PR5	GROUP - I	GROUP - II	-3.262	3.251	.577	-11.02	4.50
		GROUP - III	-1.825	3.194	.836	-9.45	5.80
	GROUP - II	GROUP - I	3.262	3.251	.577	-4.50	11.02
		GROUP - III	1.437	3.224	.896	-6.26	9.13
	GROUP - III	GROUP - I	1.825	3.194	.836	-5.80	9.45
		GROUP - II	-1.437	3.224	.896	-9.13	6.26
PR6	GROUP - I	GROUP - II	-5.182	3.152	.235	-12.74	2.37
		GROUP - III	-3.710	3.029	.443	-10.97	3.55
	GROUP - II	GROUP - I	5.182	3.152	.235	-2.37	12.74
		GROUP - III	1.472	3.029	.878	-5.79	8.73
	GROUP - III	GROUP - I	3.710	3.029	.443	-3.55	10.97
		GROUP - II	-1.472	3.029	.878	-8.73	5.79
PR7	GROUP - I	GROUP - II	2.900	5.860	.876	-13.46	19.26
		GROUP - III	3.167	6.672	.885	-15.46	21.80
	GROUP - II	GROUP - I	-2.900	5.860	.876	-19.26	13.46
		GROUP - III	.267	6.380	.999	-17.55	18.08
	GROUP - III	GROUP - I	-3.167	6.672	.885	-21.80	15.46
		GROUP - II	-.267	6.380	.999	-18.08	17.55

Comparison of pulse rate between groups post operatively at 30min,1,2,3,4,5,6,7hrs is statistically insignificant.

COMPARISON OF MEAN PAIN SCORE AFTER SURGERY AT 30MIN,1,2,3,4,5,6,7HRS

Comparison of pain scores at 30min.,1,2,3,4, 5 hrs postoperatively

	Sum of Squares	df	Mean Square	Fisher F-value	Significance (*p*)
30 min					
Between Groups:	0.021	2	0.01	0.964	0.385
Within Groups:	0.935	87	0.011		
Total:	0.956	89			
1 hrs					
Between Groups:	0.083	2	0.042	0.967	0.384
Within Groups:	3.742	87	0.043		
Total:	3.825	89			
2 hrs					
Between Groups:	62.926	2	31.463	140.385	0.134
Within Groups:	19.498	87	0.224		
Total:	82.424	89			
3 hrs					
Between Groups:	139.875	2	69.938	143.432	0.354
Within Groups:	42.421	87	0.488		
Total:	182.296	89			
4 hrs					
Between Groups:	156.472	2	78.236	262.413	0.638
Within Groups:	25.938	87	0.298		
Total:	182.411	89			
5 hrs					
Between Groups:	259.029	2	129.514	3,910.15	0.767
Within Groups:	2.882	87	0.033		
Total:	261.91	89			

Comparison of pain scores between groups is statistically insignificant.

COMPARISON OF SEDATION SCORES BETWEEN GROUPS

30min	**Sum of Squares**	**df**	**Mean Square**	**Fisher F-value**	**Significance (*p*)**
Between Groups:	2.222	2	1.111	2.071	0.132
Within Groups:	46.667	87	0.538		
Total:	48.889	89			
1hr					
Between Groups:	41.489	2	8.500	5.694	0.085
Within Groups:	316.967	87	2.750		
Total:	358.456	89			
2hr					
Between Groups:	17.222	2	8.611	2.383	0.098
Within Groups:	314.333	87	3.613		
Total:	331.556	89			
3hr					
Between Groups:	0.868	2	0.434	0.628	0.536
Within Groups:	58.052	84	0.691		
Total:	58.920	86			

Comparison of sedation scores between groups at 30min., 1,2,3 hrs is statistically insignificant.

COMPARISON OF COMPLICATIONS BETWEEN GROUPS

Group	Respiratory depression	Apnea	Pruritis	Urinary retention	Nausea and vomiting
I	0	0	0	1	0
II	0	0	0	0	0
III	0	0	0	3	0

Crosstab

			GROUP			
			GROUP - I	GROUP - II	GROUP - III	Total
urinary retentior	PRESENT	Count	1	0	3	4
		% within GROUP	3.3%	.0%	10.0%	4.4%
	ABSENT	Count	29	30	27	86
		% within GROUP	96.7%	100.0%	90.0%	95.6%
Total		Count	30	30	30	90
		% within GROUP	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.663[a]	2	.160
Likelihood Ratio	4.454	2	.108
Linear-by-Linear Association	1.552	1	.213
N of Valid Cases	90		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 1.33.

Comparison of complications between groups is statistically insignificant.

COMPARISON OF DURATION OF ANALGESIA BETWEEN GROUPS

GROUP	MEAN +/- SD (hrs)
I	4.5667 +/- 0.67911
II	5.56667 +/- 0.568321
III	7.53333 +/- 0.507416

COMPARISON OF RESCUE ANALGESIA

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
RESCUE ANALGESIA - FIRST	GROUP - I	30	4.57	.679	.124	4.31	4.82	4	7
	GROUP - II	30	5.60	.675	.123	5.35	5.85	5	8
	GROUP - III	30	7.50	.509	.093	7.31	7.69	7	8
	Total	90	5.89	1.369	.144	5.60	6.18	4	8
RESCUE ANALGESIA - SECOND	GROUP - I	30	8.57	.679	.124	8.31	8.82	8	11
	GROUP - II	30	9.60	.675	.123	9.35	9.85	9	12
	GROUP - III	30	11.17	1.984	.362	10.43	11.91	1	12
	Total	90	9.78	1.654	.174	9.43	10.12	1	12
RESCUE ANALGESIA - THRID	GROUP - I	15	12.00	.000	.000	12.00	12.00	12	12
	GROUP - II	14	11.00	.000	.000	11.00	11.00	11	11
	GROUP - III	0	.	.	.	.	.	.	.
	Total	29	11.52	.509	.094	11.32	11.71	11	12

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
RESCUE ANALGESIA - FIRST	Between Groups	132.822	2	66.411	169.602	.000
	Within Groups	34.067	87	.392		
	Total	166.889	89			
RESCUE ANALGESIA - SECOND	Between Groups	102.822	2	51.411	31.782	.000
	Within Groups	140.733	87	1.618		
	Total	243.556	89			
RESCUE ANALGESIA - THRID	Between Groups	7.241	1	7.241	.	.
	Within Groups	.000	27	.000		
	Total	7.241	28			

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
RESCUE ANALGESIA - FIRST	GROUP - I	GROUP - II	-1.033*	.162	.000	-1.42	-.65
		GROUP - III	-2.933*	.162	.000	-3.32	-2.55
	GROUP - II	GROUP - I	1.033*	.162	.000	.65	1.42
		GROUP - III	-1.900*	.162	.000	-2.29	-1.51
	GROUP - III	GROUP - I	2.933*	.162	.000	2.55	3.32
		GROUP - II	1.900*	.162	.000	1.51	2.29
RESCUE ANALGESIA - SECOND	GROUP - I	GROUP - II	-1.033*	.328	.006	-1.82	-.25
		GROUP - III	-2.600*	.328	.000	-3.38	-1.82
	GROUP - II	GROUP - I	1.033*	.328	.006	.25	1.82
		GROUP - III	-1.567*	.328	.000	-2.35	-.78
	GROUP - III	GROUP - I	2.600*	.328	.000	1.82	3.38
		GROUP - II	1.567*	.328	.000	.78	2.35

*. The mean difference is significant at the .05 level.

The time of administration of **second dose of rescue analgesia** was **statistically significant between Group I & II**.

DISCUSSION

Caudal epidural anaesthesia is an effective means of providing postoperative analgesia in children. But it may result in adverse effects due to extensive block than is necessary. ***Lee HM*** [44] observed caudal block with ropivacaine and ketamine gives longer analgesia than caudal block with ropivacaine alone. ***Senel*** [45] observed that caudal epidural administration of bupivacaine with tramadol resulted in superior analgesia. There are many practical difficulties in administering caudal epidural block.

1) It needs expertise and training
2) Invasive procedure
3) Injury to spinal cord, cauda equina, vascular injury are practical possibilities
4) Incidence of epidural haematoma and spinal haematoma is a rare possibility
5) Incidence of urinary retention and weakness of limbs after caudal epidural block is a concern

In view of all the above features of caudal epidural block, an effective alternative could be rectal diclofenac sodium suppository that

could be administered as preumptive analgesia along with premedication which provides analgesia that is comparable with that of caudal epidural block as proved in our study. This is in accordance with the study conducted by ***Moores***[46] et al. The study of Moores suggested that rectal diclofenac suppository reduced the severity of late onset postoperative pain and was not effective in the immediate postop period. This may reflect a slower onset of action of rectal diclofenac sodium. ***Tigerstedt*** et al [47] did not observe any immediate effect of intravenous diclofenac in the early postoperative phase in adults after general surgery. However ***Maunuksela***[48] et al who used an infusion of indomethacin in comparison with placebo in the immediate postoperative period in children undergoing orthopaedic or general surgery, demonstrated a decreased need for morphine in recovery and for 24 hr.

Rapid absorption of rectal diclofenac was demonstrated[49,50] but it is possible that delayed onset of analgesia in children is due to some delay in absorption from the rectal mucosa. This is because rectal diclofenac suppository takes about 1hr to reach adequate serum levels. This factor was taken into consideration by us in our study and hence the suppository was inserted soon after premedication took effect.

Comparison between caudal epidural and rectal diclofenac sodium groups showed analgesia was equivalent and comparable in duration. Average duration of analgesia was **4.5hrs** in **Group I** (caudal epidural), **5.5hrs** in **Group II** (rectal diclofenac sodium), **7.5hrs** in **Group III** (caudal epidural and rectal diclofenac sodium).

Incidence of post operative side effects were similar in all the three groups, except for urinary retention in Groups I & III, this being statistically insignificant.

Children administered diclofenac sodium suppository were awake earlier than their sedated counterpart who were administered caudal epidural block.

Rectal administration in children is a safe and convenient route of drug absorption and diclofenac sodium is available in a paediatric suppository form. It is completely absorbed after rectal administration and sustained action may provide excellent analgesia, while respiratory depressant effects of opioids are avoided. This is consistent with our study where we found rectal diclofenac sodium suppository alone or in combination with caudal epidural block provided excellent analgesia, starting about 1hr after administration and continuing for a longer time

period than caudal epidural block alone. Administration of diclofenac sodium suppository does not require expertise. There is no need for bowel preparation. It was not previously administered in asthmatics, but a study by ***Short JA*** showed that it can be safely used in asthmatics.

Rectal diclofenac was administered after induction of general anaesthesia.

In study conducted by ***Gupta*** et al. the study showed that the mean pain scores were higher in group II at 30 min but they were comparable at 1 hr showing rectal diclofenac produces less analgesia in immediate post operative period compared to caudal epidural anaesthesia. This was also consistent with study of ***Bhattacharya Dipasari***. But in our study we administered rectal diclofenac sodium suppository 1 hr prior to administration of general anaesthesia. In our study we found that the pain scores at 30 mins and 1 hr were comparable in both groups suggesting that the effect of rectal diclofenac sodium suppository and caudal epidural anaesthesia were equivalent in the immediate as well as late post operative period.

In our study we found duration of analgesia with caudal epidural block using 0.25%bupivacaine to be 4.5hrs whereas in the conducted by

AR Wolf who found duration to be 7hrs. ***Ivani G*** observed that use of 0.125% levobupivacaine 1ml/kg for caudal epidural block in children was associated with less early postoperative motor blockade but shorter duration of postoperative analgesia as compared to 0.25%solution. This was the basis for using 0.25%solution in our study.

The number of doses of rescue analgesia administered was also comparable between all the three groups and it was statistically significant.

There is no statistically significant difference in all the three groups in postoperative events and side effects.

Neurological examination of the children done prior to discharge revealed no abnormality.

CONCLUSION

Rectal diclofenac sodium suppository in combination with caudal epidural analgesia provides good postoperative analgesia in early as well as in later postoperative period in comparison to caudal epidural block alone which provides analgesia only in early postoperative period.

Administration of rectal diclofenac sodium suppository 1hr prior to the surgery provides good analgesia in the early and in the late postoperative period, than keeping it at the end of the surgery.

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INSTITUTIONAL ETHICAL COMMITTEE
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L.Dis.No. 14597/ME5/EthicsDean/MMC/2009 Dated .09.2009

Title of the work : "Post Operative Analgesia in children: Caudal Block with Bupivacaine Rectal diclofenac and combination of both"

Principal Investigator : Dr.B. Kancharamala
Post in MD Anaesthesiology [IIIyear]
Madras Medical College Ch-3.

Department :

The request for an approval from the Institutional Ethical Committee(IEC) was considered on the IEC meeting held on 23rd September 2009 at 2.00P.M. in Madras Medical College, Deans, Chamber, Chennai-3/ Pharmacology Seminar hall, Madras Medical College, Ch-3

The members of the Committee, the Secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The principal investigator and their term are directed to adhere the guidelines given below:

1. You should get detailed informed consent from the patients/participants and maintain confidentiality.
2. You should carry out the work without detrimental to regular activities as well as without extra expenditure to the Institution or Government.
3. You should inform the IEC in case of any change of study procedure, site and investigation or guide.
4. You should not deviate form the area of the work for which I applied for ethical clearance.
5. You should inform the IEC immediately, in case of any adverse events or serious adverse reactions.
6. You should abide to the rules and regulations of the institution(s).
7. You should complete the work within the specific period and if any extension of time is required, you should apply for permission again and do the work.
8. You should submit the summary of the work to the ethical committee on completion of the work.
9. You should not claim funds from the Institution while doing the work or on completion.
10. You should understand that the members of IEC have the right to monitor the work with prior intimation.

SECRETARY
IEC, MMC,CHENNAI

CHAIRMAN
IEC MMC CHENNAI

DEAN
MADRAS MEDICAL COLLEGE
CHENNAI

CONSENT FORM

PATIENT INFORMATION

Pain will occur following surgery involving the groin and genital region. It is usually treated with paracetamol which may not be adequate by itself. We are trying to see if we can improve pain relief following surgery. We wanted to compare a caudal epidural analgesia which is injecting a drug into the vertebral column, with rectally administered suppository and a combination of both. If your child is included in this study, he or she will receive either a caudal block or diclofenac suppository or a combination of both.

Your child will receive a syrup 1 hr before surgery and a suppository within 5 minutes of administration of syrup. In spite of this if your child has pain, he or she will receive oral paracetamol syrup.

You have the right to refuse to volunteer for the study and your child care will not be affected by this decision.

CONSENT

The details of the study have been explained to me . I understand that this is voluntary and I can withdraw from the study at any time. I give consent for my child to be included in this study.

Signature of the parent/guardian Signature of Anaesthesiologist

Name of the patient:

Hospital number:

Date:

PROFORMA

POSTOPERATIVE ANALGESIA IN CHILDREN: CAUDAL EPIDURAL ANALGESIA WITH BUPIVACAINE, RECTAL DICLOFENAC SODIUM SUPPOSITORY AND A COMBINATION OF BOTH

Name

Age

Sex

Weight

Hospital number

Date of surgery

Surgery done

Duration of surgery

ASA status

Group stratification

Time of administration
(Diclofenac sodium suppository/ caudal analgesia)

INTRAOP EVENTS

Time(min)	HR	BP	SPO_2
0			
5			
10			
15			
20			
25			
30			
45			
60			

POSTOPERATIVE EVENTS

Time(hrs)	HR	BP	Pain Score	Sedation Score
0				
2				
4				
6				
8				
10				
12				

COMPLICATIONS

Group	Respiratory depression	Apnea	Pruritus	Urinary Retention	Nausea & Vomiting
I					
II					
III					

MASTER CHART

S. No.	Name	Age yrs	Sex	Weight kg	Hosp. No	D.O.S	Dur O.S	Surgery	ASA	Group	Time of Administration			Post-Op Complications					
											Pre-Med	Sup-Post	Caudal	Resp Dep	Apnoea	Pruritus	Urinary Retention	Nausea	Vomi-ting
1	RAJESH	4	M	15	3498/08	16-04-09	45	Lih	I	111	9.30a.m	9.32a.m	11.13a.m	NIL	NIL	NIL	PRESENT	NIL	NIL
2	PURUSOTAMAN	8	M	23	393/09	16-04-09	60	Bil Hyrdrocele	I	111	9.30a.m	9.32a.m	10.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
3	REGAN	4.5	M	19	640686	13-04-09	60	Rih	I	11	9.40a.m	9.42a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
4	ABDULREHMAN	5	M	20	640665	13-04-09	60	Lih	I	1	9.40a.m	NIL	11.10a.m	NIL	NIL	NIL	NIL	NIL	NIL
5	VIGNESH	11	M	30	641181	18-04-09	45	Rt Orchidopexy	I	11	9.35a.m	9.37a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
6	DINESH	1 1/4	M	10	640627	20-04-09	30	Circumcision	I	1	9.15a.m	NIL	10.20a.m	NIL	NIL	NIL	NIL	NIL	NIL
7	HARIVASU	2.5	M	10	2335/08	21-04-09	40	Rt Hydrocele	I	11	9.15a.m	9.17a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
8	RAHUL	1.5	M	10	2933/08	21-04-09	40	Circumcision	I	1	9.15a.m	NIL	10.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
9	ARUN	9	M	20	375/09	23-04-09	40	Circumcision	I	1	9.30a.m	NIL	12.20p.m	NIL	NIL	NIL	NIL	NIL	NIL
10	GUNASIDDAN	4	M	10	101/09	23-04-09	30	Circumcision	I	11	9.30a.m	9.32a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
11	KESAVAN	9.5	M	21	693/09	23-04-09	60	Rih	I	11	9.35a.m	9.37a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
12	TAMILARASAN	6	M	13	7791/09	27-04-09	60	Rt Hydrocele	I	1	9.15a.m	NIL	11.10a.m	NIL	NIL	NIL	PRESENT	NIL	NIL
13	VENKATESH	6	M	17	5109/09	28-04-09	30	Rih	I	1	9.15a.m	NIL	11.10a.m	NIL	NIL	NIL	NIL	NIL	NIL
14	SEKAR	8	M	17	2014/08	29-04-09	45	Circumcision	I	111	9.10a.m	9.12a.m	11.45a.m	NIL	NIL	NIL	NIL	NIL	NIL
15	SIVAKUMAR	8	M	20	3010/08	4/5/2009	30.00	Circumcision	I	11	8.58a.m	9.00a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
16	YOGESH	2	M	10	841/09	4/5/2009	40	Circumcision	I	11	8.58a.m	9.00a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
17	POOVARASAN	4	M	13	22/09	7/5/2009	40	Pv Sac Ligation	I	11	9.15a.m	9.17a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
18	SANTHOSH	8	M	14	290/09	7/5/2009	45	Circumcision	I	1	9.15a.m	NIL	10.45a.m	NIL	NIL	NIL	NIL	NIL	NIL
19	RAMKUMAR	7	M	15	350/09	11/5/2009	20	Circumcision	I	111	9.00a.m	9.02.M	9.55a.m	NIL	NIL	NIL	PRESENT	NIL	NIL
20	BAGAVATHI	9	M	15	762/09	11/5/2009	30	Circumcision	I	111	9.30a.m	9.32a.m	10.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
21	DHARMAPAYAL	3	M	10	888/09	11/5/2009	40	Lih	I	111	9.30a.m	9.32a.m	11.25a.m	NIL	NIL	NIL	NIL	NIL	NIL
22	NITHYASREE	3	F	12	2348/09	12/5/2009	25	Lih	I	111	9.00a.m	9.05a.m	10.25a.m	NIL	NIL	NIL	PRESENT	NIL	NIL

S. No.	Name	Age yrs	Sex	Weight kg	Hosp. No	D.O.S	Dur O.S	Surgery	ASA	Group	Time of Administration			Post-Op Complications					
											Pre-Med	Sup-Post	Caudal	Resp Dep	Apnoea	Pruritus	Urinary Retention	Nausea	Vomi-ting
23	MOHAN	3	M	12	13/08	12/5/2009	40	Circumcision	I	1	9.00a.m	NIL	11.20a.m	NIL	NIL	NIL	NIL	NIL	NIL
24	SAMSUN	1.2	M	9	62/09	12/5/2009	30	Circumcision	I	1	9.00a.m	NIL	11.50a.m	NIL	NIL	NIL	NIL	NIL	NIL
25	KISHORE	3	M	11	381/09	28/5/09	30	Circumcision	I	1	9.00a.m	NIL	10.30a.m	NIL	NIL	NIL	NIL	NIL	NIL
26	JAISON ABISHEK	2	M	10	396/09	29/5/09	20	Circumcision	I	1	9.00a.m	NIL	11.35a.m	NIL	NIL	NIL	NIL	NIL	NIL
27	HARIKRISHNA	6	M	15	1031/09	7/5/2009	25	Herniotomy	I	111	9.00a.m	9.02a.m	11.55a.m	NIL	NIL	NIL	NIL	NIL	NIL
28	RAJ	9	M	18	848/09	4/5/2009	30	Rih	I	1	9.00a.m	NIL	11.30a.m	NIL	NIL	NIL	NIL	NIL	NIL
29	RAJIMUNISHA	8	F	18	1131/09	25/5/09	30	Rih	I	1	9.05a.m	NIL	11.05a.m	NIL	NIL	NIL	NIL	NIL	NIL
30	MANI	8	M	20	702/09	13/4/09	25	Rih	I	11	9.10a.m	9.15a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
31	VIGNESH	8	M	15	3009/09	4/5/2009	30	Circumcision	I	111	9.00a.m	9.05a.m	10.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
32	PRADEEP	3	M	12	7107/09	28/4/09	25	Circumcision	I	111	9.05a.m	9.10a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
33	SAKTHIVEL	4	M	15	643/09	11/5/2009	30	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
34	HEMAKUMAR	4	M	14	300/09	7/5/2009	25	Circumcision	I	1	9.05a.m	NIL	11.20a.m	NIL	NIL	NIL	NIL	NIL	NIL
35	JEEVA	4	M	13	61/09	28/4/09	30	Circumcision	I	1	9.00a.m	NIL	10.35a.m	NIL	NIL	NIL	NIL	NIL	NIL
36	GURU	4	M	14	614/09	30/04/09	25	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
37	SANJAY	4	M	15	617/09	30/4/09	30	Circumcision	I	111	9.00a.m	9.05a.m	10.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
38	JOTHI	5	F	18	2477/09	2/4/2009	30	Rih	I	1	9.00a.m	NIL	11.10a.m	NIL	NIL	NIL	NIL	NIL	NIL
39	SEENU	5	M	17	332/09	6/4/2009	35	Lih	I	11	9.05a.m	9.10a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
40	KARTHIGA	5	F	17	672/09	13/4/09	30	Lih	I	111	9.00a.m	9.05a.m	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
41	DAVID	5	M	19	2412/08	19/5/09	25	Herniotomy	I	1	9.05a.m	NIL	11.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
42	JANANI	5	F	20	86/09	19/5/09	30	Rih	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
43	SRINIVASAN	5	M	18	43/09	21/5/09	25	Circumcision	I	111	9.00a.m	9.05a.m	11.50a.m	NIL	NIL	NIL	NIL	NIL	NIL
44	LOGESH	5	M	20	144/09	19/5/09	30	Circumcision	I	1	9.05a.m	NIL	11.20a.m	NIL	NIL	NIL	NIL	NIL	NIL
45	GUHAN	5	M	18	988/09	25/5/09	25	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL

S. No.	Name	Age yrs	Sex	Weight kg	Hosp. No	D.O.S	Dur O.S	Surgery	ASA	Group	Time of Administration			Post-Op Complications					
											Pre-Med	Sup-Post	Caudal	Resp Dep	Apnoea	Pruritus	Urinary Retention	Nausea	Vomi-ting
46	PRADEEP	5	M	19	734/09	13/4/09	30	Circumcision	i	111	9.05a.m	9.10a.m	11.55a.m	NIL	NIL	NIL	NIL	NIL	NIL
47	DANIEL	4	M	15	698/09	6/4/2009	30	Herniotomy	I	1	9.00a.m	NIL	11.10a.m	NIL	NIL	NIL	NIL	NIL	NIL
48	SARATHY	4	M	14	3591/08	28/4/09	35	Rih	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
49	LAVANYA	4	F	13	1570/08	12/5/2009	30	Lih	I	111	9.05a.m	9.10a.m	11.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
50	LOKESH	8	M	19	1051/09	18/5/09	25	Circumcision	I	1	9.05a.m	NIL	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
51	PRAVEENTITAN	8	M	20	2413/08	18/5/09	30	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
52	PREETHI	9	F	21	128/09	26/5/09	35	Lih	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
53	AJAY	8	M	18	505/09	23/4/09	30	Circumcision	I	111	9.00a.m	9.05a.m	11.00A.M	NIL	NIL	NIL	NIL	NIL	NIL
54	GOKULAKRISHNAN	6	M	16	1969/08	7/5/2009	25	Herniotomy	I	1	9.05a.m	NIL	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
55	ARUNKUMAR	9	M	20	135/09	7/5/2009	30	Circumcision	I	111	9.00a.m	9.05a.m	11.05a.m	NIL	NIL	NIL	NIL	NIL	NIL
56	SUBANU	4	F	14	446/09	28/4/09	30	Rih	I	1	9.00a.m	NIL	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
57	ROBERTSON	7	M	16	74/09	30/4/09	25	Circumcision	I	11	9.05a.m	9.10a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
58	RANJITH	5	M	18	632/09	30/4/09	35	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
59	GOUTHAM	5.5	M	18	643119	11/5/2009	30	Circumcision	I	111	9.00a.m	9.05a.m	11.55a.m	NIL	NIL	NIL	NIL	NIL	NIL
60	KAVITHA	5	F	17	643810	18/5/09	35	Lih	I	111	9.05a.m	9.10a.m	11.13a.m	NIL	NIL	NIL	NIL	NIL	NIL
61	NITHISHKUMAR	7	M	17	2439/08	19/5/09	30	Rih	I	111	9.00a.m	9.05a.m	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
62	JOHNJOSHUA	6	M	16	135/09	14/5/09	35	Herniotomy	I	1	9.00a.m	NIL	10.45a.m	NIL	NIL	NIL	NIL	NIL	NIL
63	MANIBHARATHI	7	M	16	1689/08	19/5/09	30	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
64	KAMALESH	6	M	15	3001/08	21/5/09	30	Circumcision	I	111	9.00a.m	9.05a.m	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
65	PREETHI	9	F	21	128/09	26/5/09	30	Lih	I	11	9.05a.m	9.10a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
66	GOKULAKANNAN	6	M	15	116/09	26/5/09	30	Circumcision	I	1	9.05a.m	NIL	10.30a.m	NIL	NIL	NIL	NIL	NIL	NIL
67	SUNIL	4	M	14	15/09	27/5/09	25	Circumcision	I	11	9.05a.m	9.10a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
68	THANGAPANDI	7	M	17	189/09	28/5/09	30	Lih	I	11	9.00a.m	9.10a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL

S. No.	Name	Age yrs	Sex	Weight kg	Hosp. No	D.O.S	Dur O.S	Surgery	ASA	Group	Time of Administration			Post-Op Complications					
											Pre-Med	Sup-Post	Caudal	Resp Dep	Apnoea	Pruritus	Urinary Retention	Nausea	Vomi-ting
69	RAMKUMAR	7	M	18	292/09	7/5/2009	30	Lih	I	111	9.00a.m	9.05a.m	11.05a.m	NIL	NIL	NIL	NIL	NIL	NIL
70	PRASANTH	11	M	23	1091/09	4/5/2009	30	Lih	I	1	9.05a.m	NIL	10.45a.m	NIL	NIL	NIL	NIL	NIL	NIL
71	NITISHKUMAR	9	M	20	642922	7/5/2009	25	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
72	MOHANRAJ	5	M	14	850/09	11/5/2009	30	Herniotomy	I	1	9.05a.m	NIL	10.55a.m	NIL	NIL	NIL	NIL	NIL	NIL
73	VIMAL	11	M	24	3456/08	10/5/2009	25	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
74	MADHANRAJ	5	M	15	850/09	11/5/2009	30	Herniotomy	I	1	9.00a.m	NIL	11.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
75	SARATH	6	M	16	2473/08	2/4/2009	35	Rih	I	1	9.05a.m	NIL	11.10a.m	NIL	NIL	NIL	NIL	NIL	NIL
76	SANTHAKUMAR	3	M	13	3358/08	2/4/2009	25	Circumcision	I	111	9.00a.m	9.05a.m	11.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
77	MANIMARAN	7	M	18	575/09	6/4/2009	30	Herniotomy	I	1	9.00a.m	NIL	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
78	VIGNESH	5	M	15	3556/08	7/4/2009	30	Rih	I	111	9.05a.m	9.10a.m	10.45a.m	NIL	NIL	NIL	NIL	NIL	NIL
79	MANIMARAN	6	M	17	3584/08	7/4/2009	25	Circumcision	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
80	SUBBULASHMI	11	F	25	20/09	7/4/2009	35	Rih	I	111	9.05a.m	9.10a.m	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
81	MANIKANDAN	5	M	16	105/09	23/4/09	30	Herniotomy	I	11	9.00a.m	9.05a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
82	VETRI	7	M	17	3000/08	16/4/09	25	Circumcision	I	11	9.05a.m	9.10a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
83	SATHYASELVAN	6	M	16	3597/08	21/4/09	25	Circumcision	I	111	9.00a.m	9.05a.m	10.45a.m	NIL	NIL	NIL	NIL	NIL	NIL
84	LOGAPRAKASH	6	M	17	735/09	21/4/09	30	Rih	I	111	9.05a.m	9.10a.m	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
85	DINEESHA	5	F	15	99/09	23/4/09	35	Rih	I	111	9.00a.m	9.05a.m	11.15a.m	NIL	NIL	NIL	NIL	NIL	NIL
86	HARISH	11	M	25	406/09	23/4/09	25	Circumcision	I	1	9.00a.m	NIL	10.45a.m	NIL	NIL	NIL	NIL	NIL	NIL
87	VIGNESHKUMAR	11	M	26	450/09	27/4/09	30	Circumcision	I	11	9.05a.m	9.10a.m	NIL	NIL	NIL	NIL	NIL	NIL	NIL
88	TAMILVASAN	6	M	16	678/09	27/4/09	30	Herniotomy	I	111	9.00a.m	9.05a.m	10.45a.m	NIL	NIL	NIL	NIL	NIL	NIL
89	SILAMBARASAN	3	M	12	1391/09	28/4/09	25	Circumcision	I	111	9.00a.m	9.05a.m	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL
90	KARTHIGA	4	F	15	682/09	28/4/09	30	Rih	I	111	9.05a.m	9.10a.m	11.00a.m	NIL	NIL	NIL	NIL	NIL	NIL

INTRA-OPERATIVE EVENTS

S. No.	B.P											PR										
	0	5	10	15	20	25	30	35	40	45	60 min	0	5	10	15	20	25	30	35	40	45	60 min
1.	82/46	93/60	89/57	90/58	88/57	86/58	82/52	84/54	84/54	83/51		96	117	83	82	82	80	73	74	76	72	
2.	86/48	80/40	78/44	80/44	80/44	82/44	80/44	80/44	82/46	82/44	84/44	68	71	69	55	73	72	74	76	78	76	74
3.	100/60	96/56	98/58	99/58	88/55	109/61	103/66					110	74	78	84	73	87	92				
4.	103/68	100/64	104/66	96/54	94/53	102/64	100/67					110	112	114	124	126	122	123				
5.	80/48	76/46	76/46	78/48	85/56	84/55	89/64					80	82	80	81	78	76	69				
6.	94/50	90/49	90/50	90/46	92/44	94/46						118	111	110	107	112	115					
7.	82/60	80/54	78/48	78/46	78/44	76/42	78/44	78/44	78/46			106	104	100	94	96	92	94	90	88		
8.	90/44	100/50	97/47	89/45	81/46	82/44	80/42	78/40	84/44			114	122	124	122	120	117	114	116	118	120	
9.	76/42	74/41	74/41	67/37	64/37	67/35	66/35	66/34	74/48			86	74	72	74	74	70	63	58	57	73	
10.	110/70	100/60	98/42	119/62	118/62	117/61						94	110	111	108	107	95					
11.	123/87	120/84	119/54	124/66	126/67	124/64	124/66	122/64	124/82	125/76		90	74	77	73	75	70	64	67	72		
12.	112/56	98/55	99/54	108/52	91/37	91/46	88/44					106	104	96	107	80	77	76				
13.	92/47	90/44	86/42	84/40	80/44	84/42	86/46					100	94	92	90	86	84	82				
14.	94/60	71/40	69/40	69/38	70/40	72/42	74/94					84	74	72	70	62	64	68	70			
15.	94/54	86/52	84/50	74/46	72/44	70/38	72/42	76/44				114	112	110	109	108	104	102	100			
16.	90/50	84/34	82/39	85/49	80/44	82/42	84/44					114	119	120	122	99	99	94	92			
17.	77/43	80/42	76/44	77/43	85/53	83/51	75/51	80/52	84/54			92	74	72	74	63	62	62	68	70		
18.	128/90	120/80	110/84	70/36	70/35	74/39	69/34	70/34	68/35			91	90	92	86	89	92	78	88	80		
19.	130/74	100/70	81/48	78/41	77/41	78/42	80/44					92	94	114	93	91	94	96				
20.	77/41	72/51	72/39	71/46	71/46	71/43	76/46					94	92	86	82	84	69	70				
21.	103/64	81/47	92/56	105/66	99/63	92/57	94/58					110	115	111	113	106	102	103				
22.	80/46	82/42	70/40	68/38	66/36	68/38	70/40	72/42	74/46			108	104	90	84	67	68	69	70	71		

S. No.	B.P											PR										
	0	5	10	15	20	25	30	35	40	45	60 min	0	5	10	15	20	25	30	35	40	45	60 min
23.	140/90	130/86	128/84	110/56	92/51	93/45	95/45	95/46				110	108	104	106	109	107	102	104			
24.	102/82	63/46	85/51	80/52	81/51	82/52						106	102	100	96	90	90	84				
25.	88/44	86/43	88/43	89/44	90/46	92/48						90	82	82	85	90	90					
26.	127/77	60/33	82/42	80/45	80/44	84/49	84/49					134	83	84	83	80	88	90				
27.	101/80	60/44	84/50	79/50	80/49	82/51	84/49					106	100	90	94	86	90	94				
28.	86/48	78/52	100/60	90/50	84/52	101/54						92	76	74	86	7	72	69	67	77		
29.	90/60	79/53	80/52	90/65	90/64	86/58	84/57	83/55				94	78	74	85	82	77	73	69	68		
30.	94/54	86/52	84/50	74/46	72/44	70/38	72/42	76/44				114	112	110	109	108	104	102	100			
31.	77/41	72/51	72/36	72/44	71/44	76/40	74/44					100	98	96	88	80	70	88				
32.	76/40	72/50	72/38	72/46	71/44	70/42	74/40					92	94	84	82	84	70	72	68	70		
33.	76/42	78/40	76/42	77/43	85/52	82/50	74/50	80/50				90	72	72	74	62	63	64	68	70		
34.	128/88	120/78	112/82	68/32	69/34	68/34	71/38	70/34				90	91	91	88	86	88	78	76	80	81	
35.	100/80	84/50	81/50	82/52	81/52	82/52						105	102	100	96	96	84	86	84			
36.	76/42	80/41	74/42	76/42	84/52	82/50	82/50	75/50	80/52			70	74	70	74	62	60	68	70			
37.	75/40	70/50	72/38	71/44	70/45	75/40	71/44					95	92	86	84	82	70	72	76			
38.	103/67	102/64	102/66	96/52	94/52	102/62	100/66					108	110	112	113	120	122	120	123			
39.	102/62	94/55	96/56	98/57	99/56	87/54	108/64	103/64				107	78	76	82	7	85	90				
40.	102/64	81/46	94/58	104/64	99/64	94/56	93/58					105	106	112	110	102	108	114	103			
41.	100/66	102/64	102/64	96/52	94/52	100/62	102/65					108	11	112	120	124	120	122	120			
42.	102/62	98/58	96/56	99/57	90/54	108/60	102/64					108	80	78	82	74	85	90				
43.	124/76	64/34	84/44	82/45	84/46	82/42	84/43	84/48				130	83	84	80	82	86	90				
44.	128/88	120/80	110/82	68/34	68/34	71/38	72/38	70/32	68/33			91	89	92	88	86	90	80	78	82	81	82
45.	92/54	88/52	82/54	82/54	84/52	86/56	86/56	82/54				96	92	92	90	88	94	96	98			

S. No.	B.P											PR										
	0	5	10	15	20	25	30	35	40	45	60 min	0	5	10	15	20	25	30	35	40	45	60 min
46.	124/76	70/36	80/40	78/44	80/42	84/48	84/48					130	80	82	80	78	82	86	86			
47.	100/66	102/62	102/64	98/56	94/52	102/64	102/67					108	110	112	120	124	120	121				
48.	78/42	83/40	78/46	74/42	84/52	83/50	75/51	80/52				90	70	72	74	66	62	60	68	72		
49.	80/44	92/60	89/56	89/57	88/54	84/54	82/52	84/54				94	110	83	80	80	80	74	76	76	76	
50.	90/62	80/52	90/64	92/62	86/56	84/54	82/54	90/78				92	80	76	85	84	78	76	70	68	77	
51.	94/52	86/50	84/50	76/48	74/46	72/40	72/42	76/44				110	112	100	109	107	108	104	102	100		
52.	92/52	84/50	82/54	76/48	74/46	72/44	72/46	70/40	72/40			112	110	100	109	107	106	104	102			
53.	86/48	84/44	80/46	78/44	80/46	80/44	82/46	82/46				70	71	69	65	73	76	74	78	74		
54.	110/54	98/55	97/55	98/54	91/40	91/46	88/44					104	102	104	96	86	84	78	77			
55.	77/41	72/51	72/40	71/46	71/44	70/42	76/40					94	92	86	82	84	86	78	82			
56.	130/90	118/78	110/80	70/35	69/34	70/35	70/38					91	90	92	90	87	78	77	80			
57.	94/53	85/52	84/50	78/46	74/44	72/42	76/46					111	110	109	108	104	102	100	101			
58.	100/60	96/56	98/58	99/58	88/54	108/62	102/66					108	79	78	82	74	85	90				
59.	120/77	68/35	82/42	80/44	84/50	84/49	85/50					120	85	84	86	88	80	90				
60.	84/48	93/62	89/57	90/58	88/57	86/58	82/54	86/52	84/54			96	110	83	82	80	84	78	75	74		
61.	130/74	100/70	81/48	78/40	77/42	78/42	80/44					92	94	98	93	91	94	96	95			
62.	110/56	98/55	97/54	108/52	91/38	90/44	88/46					106	104	98	106	88	77	78				
63.	74/52	85/49	83/48	72/44	96/64	92/54	94/58	96/58				94	96	98	100	12	117	114	108	106		
64.	124/77	60/34	82/42	80/4	82/44	84/49	82/50					120	83	84	83	80	88	90	86			
65.	120/86	122/84	119/54	124/64	124/62	122/62	125/76					90	78	77	76	75	64	67	72			
66.	110/54	98/54	96/56	108/54	94/37	92/46	88/44					102	104	102	98	96	88	78	76			
67.	110/70	100/60	98/42	118/64	114/64	117/60						94	110	110	108	107	98	99	102			
68.	76/50	85/49	83/48	72/44	96/60	92/58	94/56					96	98	100	112	117	104	108	106			

S. No.	B.P											PR										
	0	5	10	15	20	25	30	35	40	45	60 min	0	5	10	15	20	25	30	35	40	45	60 min
69.	128/74	108/74	84/48	78/41	77/41	78/40	80/44					92	94	100	93	91	94	96				
70.	80/40	74/42	74/41	67/37	64/37	67/35	66/35	74/48				86	78	76	74	72	70	78	63	58		
71.	120/86	122/84	118/52	122/66	124/64	122/64	124/82					90	86	84	82	78	74	72	66	64		
72.	10160	62/28	72/38	72/36	73/39	73/38	78/4	80/46				94	78	76	74	69	84	68	83			
73.	80/48	76/44	76/46	78/48	85/56	84/55	89/64					80	84	6	84	88	78	79	80			
74.	100/66	101/65	102/64	98/56	96/52	100/62	100/66					108	110	113	120	122	124	122	123			
75.	102/66	104/64	102/64	98/54	94/52	102/66	100/66					108	111	113	112	122	120	121	126			
76.	80/46	92/64	88/56	88/56	86/54	86/56	82/50					96	114	82	80	80	78	72	73			
77.	102/64	80/47	92/56	104/64	99/63	92/57	94/58					100	112	108	106	105	102	100	102			
78.	74/55	85/50	83/48	76/45	96/60	98/64	94/58					94	96	100	110	115	112	106	108			
79.	77/40	74/52	76/39	71/44	76/40	74/48	80/54					94	92	88	86	82	78	76	85			
80.	100/60	96/54	98/54	88/56	108/66	104/64	102/55					100	78	76	84	73	87	92	87			
81.	76/52	85/49	84/46	72/46	96/60	92/56	94/58					94	95	100	106	117	112	108	106			
82.	125/76	70/40	82/42	80/45	83/46	84/49	84/46					122	86	88	83	80	89	90	92			
83.	120/75	78/40	82/42	80/45	80/46	84/46	84/50					120	86	89	84	88	90	82	92			
84.	84/46	94/64	88/56	86/54	82/50	84/53	83/54					96	110	86	89	88	90	94	86			
85.	80/42	76/44	74/41	68/38	66/39	67/35	74/48					86	74	72	74	70	78	58	66			
86.	80/48	76/46	78/44	85/56	84/54	88/64	77/45					80	82	84	86	78	76	70	74			
87.	84/44	78/48	76/46	78/50	85/55	84/56	89/64					80	86	85	84	78	76	68	84			
88.	122/76	84/38	84/44	82/46	84/46	84/48	86/49					120	83	84	83	80	88	90	92			
89.	103/64	88/48	92/56	99/66	92/57	94/58	100/68					110	108	106	112	104	105	107	113			
90.	125/77	80/36	82/44	80/45	84/46	82/48	84/49					120	86	84	85	82	80	88	90			

RECOVERY CHARACTERISTICS

S. No.	B.P								PR								SPO2							Pain Score							Sed score					Rescue Analgesia		
	30mts	1	2	3	4	5	6	7 hrs	30mts	1	2	3	4	5	6	7 hrs	30mts	1	2	3	4	5	6 hrs	30mts	1	2	3	4	5	6 hrs	30mts	1	2	3	4			
1.	84/54	84/54	88/56	90/60	92/62	93/63	94/64		71	70	93	96	98	100	102		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
2.	84/44	84/44	86/46	90/48	92/52	94/54			60	60	72	80	99	100			99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
3.	104/67	100/64	104/68	102/64	100/62	100/64			124	110	115	112	100	104			99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
4.	102/68	102/68	104/64	106/68	106/68	110/68			100	94	98	86	84	94			99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
5.	84/55	86/55	88/58	90/52	92/54	94/56			70	74	76	86	90	96			99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
6.	93/50	91/48	92/48	91/48	90/42	92/46			117	120	124	126	122	118			99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
7.	78/46	80/44	82/46	80/48	80/46	78/46	80/46	80/44	94	98	100	96	94	94	96	94	99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
8.	86/46	88/48	88/50	90/52	92/54	93/54	94/55		122	120	118	116	122	124	122		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
9.	76/48	78/49	80/50	82/52	84/54	84/54	86/56		70	71	72	74	84	88	94		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
10.	112/60	114/62	114/62	117/64	120/68				88	86	90	92	94				99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
11.	119/72	120/74	122/76	124/74	126/76	128/78	130/80		74	78	82	86	90	92	94		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
12.	88/44	89/45	90/46	91/46	92/46	93/46	94/46		78	80	82	86	89	96	99		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
13.	86/47	87/48	88/49	88/50	89/48	90/49			86	88	90	92	96				99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
14.	80/50	84/54	86/56	90/56	92/56	100/58			70	72	74	76	80	84			99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
15.	94/50	94/52	94/54	96/56	96/56	97/58			112	106	108	110					99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
16.	90/42	92/42	94/46	92/44	94/46				94	96	98	96	100				99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
17.	84/54	85/54	85/55	86/56	85/55	86/56	88/57	88/56	74	76	78	80	84	86	90	92	99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
18.	70/34	72/36	74/38	75/36	76/90	78/42	82/46	84/48	84	86	82	88	89	90	94	92	99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
19.	84/46	90/48	92/50	94/54	96/56	96/56	97/58	98/56	100	102	116	101	103	104	110		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
20.	76/42	78/44	80/46	82/46	84/48	84/50	90/54		70	72	74	76	78	78	80		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
21.	96/54	98/56	100/56	102/58	102/58	104/60	104/60		104	106	108	110	112	114	116		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	

S. No.	B.P								PR								SPO2							Pain Score						Sed score					Rescue Analgesia		
	30mts	1	2	3	4	5	6	7 hrs	30mts	1	2	3	4	5	6	7 hrs	30mts	1	2	3	4	5	6 hrs	30mts	1	2	3	4	5	6 hrs	30mts	1	2	3	4			
22.	79/47	76/48	77/48	80/50	82/52	84/54	84/54	86/58	72	74	74	76	78	84	86		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
23.	96/46	98/48	98/48	100/47	100/48	102/48	102/50		102	104	104	108	110	114			99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
24.	84/54	86/54	86/56	88/57	90/58	90/60			86	86	88	90	94	96			99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
25.	92/48	94/50	94/52	94/52	96/54	96/54			90	92	92	94	96	96			99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	7	11	
26.	84/50	85/52	86/54	88/56	90/58				84	82	80	84	90				99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
27.	90/54	86/52	92/50	100/60	94/56	96/54			96	84	92	84	92	90	94		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
28.	100/94	94/52	98/48	86/58	96/46	88/48			78	77	82	86	90	86	84		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
29.	92/64	92/64	94/64	94/68	96/70	94/55			84	90	84	86	76	78	78		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
30.	94/50	92/52	94/50	96/54	96/54	97/58			110	106	108	106	110	112	110		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
31.	74/44	76/42	80/46	82/44	84/46	84/44	82/5	88/52	78	72	76	74	76	80	79	80	99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
32.	75/40	76/42	82/48	80/44	82/46	84/48	90/52	88/54	70	72	74	76	76	76	78	80	99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
33.	84/54	84/52	85/54	85/5	84/54	86/54	88/54	88/54	74	75	75	80	82	82	85	86	99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
34.	68/32	70/34	70/36	72/34	74/36	74/42	76/40	76/42	82	84	82	86	88	86	90	92	99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
35.	82/52	84/52	86/54	88/57	90/58	90/60			85	84	88	90	94	95	94		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
36.	82/54	85/54	85/54	86/54	85/52	85/54	88/57	88/54	74	75	76	82	82	84	90	91	99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
37.	74/40	Jul-42	78/44	82/44	84/46	85/52	90/52		74	70	75	74	77	78	80		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
38.	100/68	102/66	102/62	104/66	102/64	110/66			98	96	94	98	88	86	84	94	99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	1		4	8	12
39.	104/66	102/62	104/68	102/62	100/62	102/64			120	108	114	110	100	104	102		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
40.	96/54	97/56	100/54	103/57	101/56	104/64	104/62		102	106	108	106	112	114	115	111	99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
41.	100/66	102/70	104/62	104/66	104/66	106/68			99	92	94	88	82	92	96		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
42.	102/66	100/62	103/66	100/64	100/62	101/63			120	110	114	111	106	102			99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
43.	82/47	85/50	84/52	88/56	90/56				86	84	82	84	89				99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
44.	70/36	72/38	70/36	72/34	75/38	76/40	79/40	78/42	82	82	84	86	88	90	92	96	99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12

S. No.	B.P								PR								SPO2							Pain Score							Sed score					Rescue Analgesia		
	30mts	1	2	3	4	5	6	7 hrs	30mts	1	2	3	4	5	6	7 hrs	30mts	1	2	3	4	5	6 hrs	30mts	1	2	3	4	5	6 hrs	30mts	1	2	3	4			
45.	90/54	92/54	89/54	92/55	98/58				95	95	98	102	101	103			99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
46.	82/52	83/50	86/54	88/54	90/56				82	80	78	82	90	87			99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
47.	102/66	100/64	102/62	105/66	106/68	110/68			98	94	96	88	86	94			99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
48.	82/52	84/53	85/56	86/55	86/54	86/57	88/55		73	75	80	82	84	85	86	90	99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
49.	82/50	82/54	88/54	90/52	92/60	93/62	94/62		70	72	88	94	96	100	101		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
50.	92/64	90/62	94/63	96/70	93/66				76	78	80	86	89	90	98		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
51.	94/52	96/54	94/5	96/5	96/58	97/56			110	108	106	105	104	102	100		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
52.	92/52	96/54	96/56	98/54	95/55	92/50			110	111	108	106	104	102	104		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
53.	84/44	86/42	89/48	90/47	92/52	94/54			64	68	74	80	96	98	100		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
54.	88/44	88/45	89/45	92/44	91/46	92/46	94/46	93/44	78	80	86	88	80	90	78		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	5	1	5	9	
55.	76/42	78/46	82/44	82/44	89/46	84/50	90/52		74	76	75	78	75	77	80		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
56.	70/35	72/38	72/38	74/36	75/38	76/40	78/42		84	83	82	88	86	87	90		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
57.	94/52	94/53	93/54	96/56	97/58	90/50	92/54		112	108	106	110	109	106	104		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
58.	104/66	102/62	104/66	102/64	100/64	100/64	104/62		118	110	115	113	108	104	106		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
59.	84/52	85/50	86/52	88/54	92/60	88/53			84	82	83	90	88	86			99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
60.	84/54	82/56	87/55	90/52	92/62	93/63	94/62		78	76	74	93	96	98	100		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
61.	84/46	90/48	92/50	94/54	96/54	96/54	97/58		100	98	96	94	86	102	99		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
62.	88/44	89/44	90/46	91/45	92/44	96/46			78	80	84	86	90	92	79		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	3	2	2	1	5	9	
63.	96/58	98/56	100/62	102/64	102/64	104/64			104	106	10	112	116	109	106		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	1		6	10	
64.	84/52	85/52	84/53	88/54	90/56	92/56			84	82	80	86	90	94	96		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	5	2	1		8	12	
65.	118/74	120/76	122/76	128/78	130/80				74	76	78	82	84	86	90		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	3	2	1		6	10	
66.	87/44	89/45	90/46	91/44	92/46	93/46			78	76	74	75	78	80	86		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	2	1	5	9	
67.	110/60	112/64	112/64	120/68	116/70				88	86	90	92	94	96	98		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	1		5	9	11

S. No.	B.P								PR								SPO2							Pain Score							Sed score					Rescue Analgesia		
	30mts	1	2	3	4	5	6	7 hrs	30mts	1	2	3	4	5	6	7 hrs	30mts	1	2	3	4	5	6 hrs	30mts	1	2	3	4	5	6 hrs	30mts	1	2	3	4			
68.	96/58	98/58	100/61	102/64	102/64	104/64			104	102	106	110	116	118	114		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
69.	84/46	90/46	92/50	94/54	96/56	97/58			104	96	98	94	92	88	89		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	5	2	1		8	12	
70.	76/48	78/49	80/50	82/52	84/52	86/54			78	75	74	76	84	88	86		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	3	2	2	1	5	9	
71.	116/74	120/74	122/75	124/74	126/76	128/78			78	76	77	86	84	90	92		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
72.	88/44	89/45	90/46	92/48	92/46	93/46			78	79	74	76	75	86	89		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
73.	84/55	86/54	88/52	90/54	92/56	94/55			70	72	76	79	86	90	96		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
74.	100/66	100/67	104/62	106/66	105/66	108/68			89	99	94	110	100	108	99		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	4	8	12
75.	102/66	100/66	104/64	106/66	105/66	105/64	108/68		100	96	94	98	85	52	96		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
76.	84/52	82/56	86/54	89/54	92/62	90/60	94/62		70	76	75	74	94	96	98		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
77.	96/54	98/56	100/58	102/58	102/56	105/60			104	106	105	110	112	114	116		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
78.	96/58	98/56	100/65	102/62	104/64	104/62			105	106	110	114	118	120	112		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	1	
79.	76/42	78/44	80/46	84/48	86/50	90/56			78	76	75	76	78	80	84		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
80.	104/67	100/64	104/68	102/63	100/62	101/62			120	110	114	112	105	104	99		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
81.	96/56	98/55	100/64	102/64	104/66	106/68			106	110	108	114	112	106	118		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		5	9	11
82.	84/56	85/54	86/53	88/54	90/56	92/56			84	82	80	84	86	90	92		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
83.	84/53	85/54	86/54	88/56	90/56	86/58			84	82	80	90	88	92	94		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
84.	84/54	84/52	88/55	90/64	92/58	93/64			78	76	85	96	98	100	102		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
85.	78/48	76/49	80/50	82/52	84/54	86/54			76	75	74	86	88	94	96		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
86.	84/55	89/58	86/54	88/58	90/52	94/56			70	74	76	86	90	96	94		99	99	99	99	99	99	99	0	0	0	2	3			5	3	2	2	1	5	9	
87.	86/54	87/55	89/56	90/54	92/54	94/56			78	74	76	86	90	94	95		99	99	99	99	99	99	99	0	0	0	0	0	3	4	5	3	2	1		6	10	
88.	84/54	85/52	86/54	88/56	90/58	92/52			84	82	80	8	86	90	94		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		8	12	
89.	96/54	98/56	100/56	102/58	104/60	103/64			104	106	108	112	114	116	109		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	
90.	84/50	85/52	86/54	88/54	90/56	94/54			84	82	80	84	84	92	96		99	99	99	99	99	99	99	0	0	0	0	0	0	3	5	5	2	1		7	11	